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MANUALS
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ADVANCED
SERIES



N^o 8

HOW TO TEACH
DOMESTIC - ECONOMY
SECOND BRANCH

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Manuals of the Science and Art of Teaching

ADVANCED SERIES, No. VIII.

HOW TO TEACH DOMESTIC ECONOMY

SECOND BRANCH

*(FOOD, ITS COMPOSITION, FUNCTIONS
AND PREPARATION)*

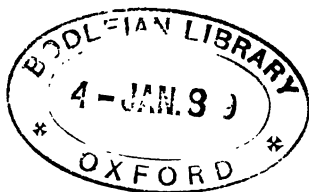


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The wide circulation of the National Society's Manuals on the 'Science and Art of Teaching' has induced the Literature Committee to undertake another series of Manuals on more advanced subjects, which they trust will be useful not only to Teachers in Elementary Schools and Students in Training, for whom they are primarily intended, but also to Teachers in Secondary and Higher Grade Schools.

The Manuals of the present series—like those which have preceded it—have been written by men of distinguished reputation in their various subjects, and who have had large experience as teachers and examiners. They include all the subjects in Schedule 4 of the Education Code, with the exception of Mathematics, which is fully treated in the 'Pupil Teachers' Course of Mathematics,' published by the Society. The Manual on Teaching Languages has been planned to comprehend the teaching of German and French as well as Latin. In addition to the subjects under Schedule 4, the present series includes a Manual on the Training of Pupil Teachers, by a very successful Lecturer on Method in one of the larger Training Colleges.

In order to obtain greater clearness and precision, each subject has been treated independently, and is complete in itself.

DOMESTIC ECONOMY.

SECOND BRANCH.

CHAPTER I.

THE COMPOSITION OF FOOD.

The subject generally.—The Code now recognises, and very wisely, the importance of instruction on the subject of the composition, nutritive value, functions, and proper preparation of food, by making these points a separate division of Domestic Economy, and requiring their study to be a necessary part of every girl's course of that branch of knowledge.

In all specially girls' schools, there will be no practical difficulty in the fulfilment of the Government conditions. Every pupil taking up Domestic Economy at all will be taught and examined in both branches. Nor will there be any difficulty, though there will be disadvantage, in the case of schools for boys only. They will be instructed in the first branch only of Domestic Economy, and the second will be omitted, though very greatly to their loss. For widely useful though the first branch be in teaching them many matters essential to their home comfort, health, and well-being, there can be no question that these things cannot be

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sought and gained in any true fulness without knowledge also on the subject of food, on the fitness, the supply, and the preparation of which so very much depends.

The subject should be taught to boys as well as girls.—But in the case of a mixed school another difficulty arises. Boys who are taught Domestic Economy need not, while girls must, take up the second branch ; the effect of which distinction would probably be to complicate the time-table, or to discourage the study of the subject altogether. Is there any remedy for this? I think so. Make every part of the subject, in both branches, a matter of instruction *to boys and girls alike*. Let the boys as well as the girls know something of the nature, functions, and even preparation of food ; there will be no inequality in their instruction, no trouble in separate teaching, and, as a result, when they grow up and marry, there will be, as a consequence of the fuller teaching, two chances, instead of one, in every household for the putting into wholesome practice those essential principles of health and comfort which can only be fitly inculcated by lessons upon food as well as on all other points of Domestic Economy.

Therefore have no fear or hesitation about teaching the whole subject, in both its branches, to boys as well as girls. There are but few schools in which the preparation of food can be really *practically* taught ; and where it is, such a handbook as Mrs. Buckton's 'Food and Home Cookery' will be both valuable and necessary. The *principles*, however, of food preparation are as valuable for boys as for girls, and the former can never be injured by even a considerable knowledge of its practice.

Definition of food.—In its widest sense you may teach your class that everything which tends to sustain life is food ; and from this they may gather that food can only be consumed by living things. But you must at once limit

your sense of the term. Show them, if you will, that besides men, beasts, and insects, plants of every sort are living things, and so far under the same conditions with animals as to need food for existence as well as for growth ; but then remove these from your sense of the term as applied to our present study, by limiting your meaning to *the food of man*. Thus you may make them see that *the food of man means everything the consumption of which tends to keep human beings alive*.

What is food for ?—This, in other words, is the same thing as asking what the functions of food are, which, according to the arrangement of the Code, is relegated to the second year's study of the food subject, and will be treated further on in this manual. But you cannot approach the question of what food is made of (that is, its composition and nutritive value), without giving your class a clear notion of what it is meant to do ; since it is plain that we cannot define what is food and what is not without some general notion of the proper function which gives it a claim to be called a food at all.

You must therefore so far encroach upon the later teaching as to show your pupils (as you may, by various simple illustrations) the facts—

Firstly, that a body wears out, and needs supply.

Secondly, that a body grows, and needs substance.

Thirdly, that a body must keep up a certain temperature, and needs fuel ; and,

Fourthly, that a body works, and needs power, force or strength.

Stress to be laid on these points.—You cannot take too much trouble in making the children understand this matter thoroughly. For a right sense of this is the foundation of the whole philosophy of food. Give them abundant illustrations of it in every form. As to waste and replacement, show how use

wears out their slate-pencils, which must in time be replaced ; how their clothes wear out and must be patched and mended ; how houses wear out and have to be replaced by new ones. As to growth and supply you can illustrate these by making them think of the growth (in spite of constant cutting and trimming) of the hair and nails ; that this growth seems unceasing, and yet must be supplied from some source or other. As to temperature and fuel, you have the familiar examples of fire, lamp, and candle ; and as to work and power, you have the whole range of illustration from the boiling kettle to the steam-engine at your command to give examples of your meaning. Nor need you be content with these ; a multitude of other simple illustrations will occur to your mind, which you will really find it worth while to note down in a pocket-book for reference in your preparation and for use in your teaching.

The necessary elements of food.—In the widest sense the food of man may be said to be compounded of substances of two sorts, *carbonaceous* and *nitrogenous*—fuel-forming and flesh-forming. See that *every* child in your class (not just the one or two most attentive ones) is clear about these two words. You may help their memory by writing on the black-board the derivation of *carbonaceous*, the Latin *carbo*, a coal. [Cf. *carbon*, i.e. charcoal.] This will associate the notion of *fuel* with the word in the children's minds. Make them understand clearly that all food is made up of these principles ; but show them that some substances may contain both principles, and others only one. For example, there is no nitrogen, or flesh-forming principle, in dripping, lard, butter, treacle, or sugar. Let them learn further that though some of our foods contain no nitrogen, all of them contain some carbon.

Exercises on above.—Write on a black-board the names of some commonly used articles of diet, with their relative contents of carbon and nitrogen. These can be ex-

tracted from the table of Food Constituents on page 83 of Bartley's 'Domestic Economy'; we should print some here, but that we wish you to give many of these exercises to your class, varying some of the foods named on your black-board from time to time. Now make the children understand that *about twenty times more fuel-food is wanted than flesh-forming food*, and let them write down in their books or on slates (the former is preferable, as they may take the books home, and talk on the subject to their parents) their opinion as to the relative feeding value of the different foods cited.

Suppose you give them the following:—

Food	Grs. of carbon per lb.	Grs. of nitrogen per lb.
Indian meal contains	3,016	120
Sugar	2,955	0
Beef	1,854	189
Oatmeal	2,831	136

and ask them (either in the class, or as a home lesson) to find out for you how much excess or deficiency of nitrogen each of these different foods contains. Make them work the proportion of nitrogen required by the carbon to make it into perfect food. If the proportion of 1 to 20 be borne in mind, they can easily add in a third column with + or — sign the proper quantity, thus:—

Food	Grs. of carbon	Grs. of nitrogen	Pro-portion	Difference of nitrogen grs.
Indian meal contains.	3,016	120	150 —	30
Sugar	2,955	0	150 —	150
Beef	1,854	189	92 +	97
Oatmeal	2,831	136	141 —	5

Let them work many examples of this kind, till they are as familiar with the process of finding out the excess or deficiency of nitrogen in any food as they are with working the rule of three. This will make it easy for them to work two other sets of exercises, one on the *comparative values* and the other on the *best combinations* of foods.

Distinction between animal and vegetable foods.

—Your pupils thus far will have been taught to consider all foods together, without division into the two great classes of animal and vegetable. Such a table as I have referred to in Mr. Bartley's book does not distinguish these even by position. But it will be well to make the class clearly understand the difference. Many people imagine, until they are taught better, that animal food means meat only, and quite forget that milk, cream, butter, cheese, and eggs are animal food. Many people who call themselves vegetarians eat melted butter with all green vegetables, and many other such mistakes are made. It really, however, does not matter whether we use either animal or vegetable food almost exclusively, or whether we combine them both, provided we secure a proper proportion of the necessary elements of nutrition in the food we eat. A good way of proving this truth to the children will be to suggest the comparison between green vegetables and beef as producing nutrition. They will see that there is vastly more nitrogen in beef than in grass. But ask them what made the beef, and they will say at once that it was the grass eaten by the ox; so that they will see that a sufficiency of nitrogen may, after all, be obtained from green food, if only enough of it be consumed.

Mineral food. — Your class will have learned that carbon and nitrogen are the essentials of food, and a little further on they will learn the common-sense way of combining these two in the least wasteful way. But as you show them that for the making of flesh and supply of fuel these two ingredients are wanted, you must teach them further that *mineral food of some sort, though in very small quantity indeed, is necessary for man.* You may show this by making them consider how necessary we all find a little salt with what we eat, though a great part of our food, in its natural form, already contains a portion of that mineral.

Liquid food.—Besides showing, as you will now have done, the ingredients and the kinds, you will have to put before your pupils the different *forms*, of food. Most of them at first regard only solids as food, but a very little questioning will satisfy them of the importance of liquid food. The fact that infants cannot take any solid food till they obtain their teeth, that men or animals have been known to live for weeks with only water, and that people can exist even for years in good health on no other sustenance than milk, will make this clear.

CHAPTER II.

COMPARATIVE VALUES OF FOODS.

Comparative values of different foods.—When your pupils are thoroughly practised in determining the proportions of carbon and nitrogen in various foods, they may be very easily taught to appreciate in some degree their comparative values. Set them *a great many examples* of such comparisons, drawn from such tables of constituents of food as I have already cited. If the table itself has been copied down by the children in their note-books, it will afford a very easy and interesting reference. Let the comparisons, if possible, be set as home lessons, as by this means the attention of parents will often be brought to the subject, and a step taken towards correcting the enormous waste of money which is caused at present, by entire ignorance as to what food ought to be used, and by common prejudice against trying anything new.

Combination of foods.—When your classes are *well versed*, as you should make them, by constant practice, in the proper constituents and comparative values of different foods, you may ply them with exercises on the best way of *combining* foods together. Thus they will soon learn that carrots and cabbage, for instance, as an accompaniment to boiled beef, is not a mere matter of arbitrary taste, but of good common sense—the deficiency of fuel-food in the beef being compensated by its excess in the vegetables, and the deficiency of flesh-forming food in the vegetables being

compensated by its excess in the beef. Show them by this example that, if they had to live on beef only, they would require to eat twice as much nitrogenous food as they wanted, in order to keep up the necessary warmth of the body; while, if they had nothing but the vegetables to live on, they would have to eat twice as much fuel-food as they wanted, in order to supply the natural waste of tissue; whilst, by combining the two, the necessary amount of each principle would be taken into the system with the smallest amount of waste.

You may, after giving several instances of combining two sorts of food, bring the children on to practise combinations of three or more kinds; from showing them how to balance ingredients at a single meal, you may let them make combinations of ingredients for a whole day's diet—breakfast, dinner, and supper.

Application of these principles.—You may take endless occasions in these lessons, not so much of asserting, as of letting the children work out for themselves, the knowledge of many every-day follies in the choice of diet commonly used amongst us. For instance, with regard to the use of liquid food (which you must also make them combine in the dietaries you teach them to draw up), you can show them the amazing difference in food value between milk, which so few persons think of using, and beer or porter, consumed by so many. Suppose the prices of milk and beer to be the same (averaging fivepence a quart), let them calculate the relative value of each as real food for man. They will see that *a quart of milk has more than twice the fuel value, and forty-four times the flesh-forming value of beer or porter*—a lesson which may do great good not only to the children themselves, but to others to whom they may repeat it.

Errors as to relative values of food.—You must frequently and forcibly put before your pupils the great mis-

takes commonly made in England as to the value of food. Give them the example of bread. Let the children whose parents eat white bread of 'seconds' flour, hold up their hands. Then those whose parents use 'firsts' flour. You will probably find there are ten of the latter to one of the former. Try the same question with regard to brown or white bread. You will be pretty sure to find the same result. Explain to them over and over again the constituent parts of a grain of wheat, till they thoroughly understand it, and see the utter folly of using only the starchy part of the grain, which is contained in the 'firsts' flour, and leaving out what are called the albuminoid materials contained in the various coverings of the grain when it goes to the miller, and all of which are contained in 'seconds' flour.

Different food adapted to different circumstances.—Though I have advised you to teach the importance of a general proportion of say twenty parts of fuel-food to one of nitrogenous, you must not allow your classes to imagine this a hard and fast rule. It is the ordinary average proportion for human beings ; but varies considerably according to age, work, and season. Make your pupils understand this by asking what time of year people want warmth most. Of course they will say in winter, therefore they will see that at that season they should take more fuel-food. In the same way they will want more meat, a greater amount of nitrogenous food, when doing very hard work than at a time when they have very little to do, because in the latter case there will not be so much force and tissue used up in labour and requiring to be replaced ; and similarly they will understand that children who are growing fast will want a great deal more food to supply the demands of their growth than old people who have done growing and work little.

Limits to nutritive value of various foods.—The question will naturally occur to some of your pupils (even

though they have not the courage to ask you before their companions), why should we not absolutely restrict our diet to some one suitable food. Take the case of oatmeal, which in its supply of necessary food elements is probably the most perfect single article of human consumption to be found. Why should not men live exclusively upon this? The answer is to be found, not in the fact that the food itself will not sustain life effectually, but that if there be too great sameness of food the appetite will not be keen enough to induce people to eat sufficient for the supply of their bodily wants. Of course there are many foods which are continually eaten. For instance, most people can eat bread and potatoes every day of their lives, though they would get very sick of eating plum-pudding, or treacle, or calves' liver, or even partridge, every day for a couple of months. But in general people have better appetite, better digestion, and better health for having variety in their food. If your school be in the country, you can illustrate this by setting them to enquire about the produce of cows in the neighbourhood. They will be told everywhere, if they do not know the fact already, that cows which are led out to feed every day by the wayside hedgerows produce more milk and butter a week than the regular dairyman's cows, which spend weeks at a time on rich pastures; the reason being that on the pastures their diet, though abundant, is all of one sort; while the wayside feeder crops nourishment with an appetite all the better for being tempted by a great number of the different sorts of plants which grow wild, and thus afford a variety and change of diet every day.

Common errors with regard to food.—You may do great eventual good by giving many careful lessons on this subject. You will find that, generally speaking, prejudice is quite as much the source of such errors as ignorance, and you should incidentally make clear the folly of such prejudice. I will give you a case which may explain what I mean. I

had been speaking one day in a cottage as to the entirely unsuspected value of oatmeal porridge as a cheap and wonderfully nourishing and perfect food, when the master of the house said, 'Ah! I could never eat that stuff!' 'Have you ever tasted it?' I asked. 'Not I,' was the reply; 'I'm sure I could never get it up to my mouth!' Urge upon your class the common sense of at least tasting things that are known to be good for food, rather than ignorantly rejecting their use; showing them that many people come in time to be very fond of food which at first they disliked the notion of even looking at, and that it is time enough to refuse to use a wholesome and cheap article of diet, when we have found out that we really dislike its taste.

I have referred elsewhere to the foolish prejudice which leads so many people to use only first flour for bread, thus leaving out all the nitrogenous or flesh-forming qualities of the grain, and only using, at foolish expense, the starchy part. I have found people answer me, when I have shown them that those wasted parts of the wheat were just what men used, instead of flour, to fatten pigs, that they did not see why men should be expected to eat pigs' victuals! The folly of this is plain: the food, if good for a pig's body, is probably good for a man's body, and if the persons who gave the answer were right, they ought to drink no water, because cows and horses drink it too. This is another sort of prejudice which you will endeavour to work out of the minds of your pupils.

The extravagant use of meat.—Try to show how much further wages would go than at present, if people knew how general a mistake is made as to butcher's meat in large quantities being really the best food. Within the last ten years (1870-80) the quantity of meat eaten per head of the population has nearly doubled, and yet men in general are not twice as strong, or twice as healthy, as they used to be. Show that though meat is excellent food, and

desirable to be eaten from time to time to give change and variety of diet, yet its place as a nutritive can be very well supplied by materials which are not much more than a tenth as costly. Point out that multitudes of men who work hard think nothing will keep up their strength but eating meat three, and even four, times a day, and yet others are quite equal to them in the work they do and the strength they possess; and that those who either never eat it at all, or only occasionally, spend a very great deal less in the food they buy without being really worse fed, and therefore have a great deal more money at their disposal, for other purposes of comfort and enjoyment, than those who spend so much in meat.

CHAPTER III.

THE FUNCTIONS OF FOOD.

Why do we need food at all?—We come to the second division of the Food subject—the functions of food, at which I have already slightly hinted in the preceding chapter. Many a person may have said or thought, ‘What a convenience it would be if we could do without eating or drinking every day of our lives ! How much trouble, and labour, and anxiety it would save us !’ But a very little knowledge of the nature of our bodies would show how impossible any such arrangement must be.

For there is a continual waste going on in our bodies by the very bodily effort to remain alive. Make your class understand this. Let them learn to feel their pulses at the wrist, to compare the beating with their heart-beats, and to understand that, even without their choice, their body is doing some work. From this let them understand that when that work stops the body dies ; that the existence of pulsation makes the difference between life and death. Next make them understand how everything else in constant use becomes worn, and may become quite worn-out. If they see that this is the case even with hard metals, such as knives, forks, and pokers are made of, which are very difficult to wear away, they will readily believe that soft textures like the linings of all the blood vessels in the body must wear out too if something is always rushing along them, as the blood is, and causing friction (or rubbing) and heat as it goes. Show them how the hand or foot may become blistered, the one by

handling a spade or an axe, the other by rubbing against the leather of a shoe, and how nature, in a wonderful way, supplies new skin to take the place of that which has been worn away by this friction. If this be plain they will see that unless the body were given something in the way of food which, by its own way of working, it could use in repairing its damages and supplying its losses, it would soon be altogether worn away.

This will make them all see at least one good reason why man cannot do without food.

Continuous supply of food necessary.—The next thing to show is that food is constantly necessary to man. Of course, to some extent this is done by showing that as the waste and wear of the frame is continuous, the supply for its repair and replacement must be continuous also. A little questioning on the causes why people stop eating at all—namely, from being unable to eat much at a time—will, however, bring your pupils to see why they are compelled to eat often. You will lead them to a general notion of the need of a continual process of turning food into flesh, fat, fuel, and force, which has to be carried out by the stomach and skin in digesting and assimilating food; and you will show them that this is a laborious process, which can only be carried out on small quantities at a time. You will probably lead them to explain for themselves the result of eating too much; that the stomach naturally rebels against carrying out a task too great for its powers, and refuses to retain this superabundant food.

Having shown that nature refuses overfeeding, show further that it insists upon sufficient feeding; that as it causes a feeling of disgust against even dainty and delicious food when sufficient has been eaten, it also causes a feeling of necessity or craving for even plain food when one has been left long enough without it to have completed the process of digestion.

Appetite for food.—I have said that nature causes

that feeling of desire for food commonly called appetite. A man who knows nothing about the composition of food, or its functions exercised on the human body, understands very well what appetite means. For otherwise he would not exist, since, as a baby, he would not have known how to take food. Thus, if you ask a child in your class why he eats his dinner, he will say, 'Because I am hungry,' not 'Because the human frame requires a regular supply of food to fill up the place of all the wear and tear which is continually going on in the body.' The sense of hunger is the reason why he eats, not the feeling of the necessity of nutrition. But you must not leave this statement concerning appetite without giving some special warning to the children against supposing that appetite is a sensation to be always unhesitatingly yielded to. Suggest to them the common experience of a school-treat, and let them call to mind how many of them who felt quite in want of an additional slice of cake would really not have felt able to swallow a few mouthfuls of dry stale bread, and they will see at once that the feeling of desire to eat may be a bad guide, as leading people to eat more than nature needs, or than can do good to the body. And carry the teaching, if you will, a little further, by telling them (for they will not know it of themselves) that the sense of hunger they experience for food is a feeling exactly the same as a drunkard feels when unable to get drink, or a smoker feels when obliged to do without tobacco ; and that the man hungry for food, the drunkard craving for drink, the smoker longing for tobacco, all alike describe their sensation as '*a sort of sinking*.' The great danger of yielding to appetite should be shown to lie, not in the temptation to take too much real food ; for nature must have real food, and the taking of a sufficiency of food extinguishes the eater's appetite ; but in contracting the habit of indulging false appetites for matters which are not food, such as drink and smoking, the desire for which is not extinguished by supply ; so that thoughtless, self-indulgent

men who yield to such habits have no safeguard against excess and that ruin of health and energy which excess is sure to cause them sooner or later.

You may also point out that the habit of yielding to an appetite for even apparently harmless things, such as cold water, can grow on people very rapidly; while by disciplining and overcoming our appetites as a matter of duty, we find our wants the fewer, our bodies the healthier, and our lives the easier.

The ingredients of which food should consist.

—Knowing that the functions of food are to supply the body, you will find it will help you if you show what ingredients form the body, and consequently what ingredients should be looked for in food. Our bodies, then, you will show, are made up of different matters in different proportions. If nine-tenths of our bodies consist of water, for instance, the children will easily understand that the same proportion of water to other food would not unreasonably be taken. Yet, unless you explain this, they will not believe your statement. They will say, ‘If all the other food we take in a day be supposed to fill a quart measure, we are quite sure that none of us drink nine quarts of water in a day.’ Give them, therefore, several simple proofs that every food they swallow contains water in more or less degree. Let them weigh a large potato, for instance, and write down the exact weight, and then, after letting it bake without burning, in the ashes or in the oven, for several hours, let them weigh it again, and mark the difference; then set them thinking where the lost weight has gone, and in what form they will find it has really been evaporated, that it has disappeared in the form of water, which must therefore have been in the potato before baking. You may even let them prove the matter to their eyesight, by pulling asunder a new-baked loaf of bread, and seeing how the steam goes out from each portion. This, however, is only in passing. The point to be shown

is the quantity of water taken in the food in proportion to the amount of water in the body to be fed. This water, as we shall see further on, is wanted in great proportion both to supply the process of food-preparation, first in the mouth and then in the stomach, and also to present all the food in its liquid and digested form to those organs of the body which are to take the different parts of such food and turn them to special uses.

Substances necessary in nitrogenous food.—Before now you will have been teaching your class in general terms the two forms of food; that it must consist partly of nitrogenous, or flesh-forming, and partly of carbonaceous, or fuel-forming elements. Let them now learn to distinguish and explain the different substances wanted by the body in nitrogenous food. Make them familiar with the meaning of *gelatine*, *fibrine*, *casein*, and *albumen*, and exercise them as far as their intelligence will allow on the combination of these things in the structure of their bodies. Give them, for instance, a notion that in order to supply bone in the body, food must be taken which combines gelatine and fibrine, as well as some such mineral component as lime, for example. If this be wanting, let them understand that a child's bones will not harden, and illustrate this statement by showing how when hens lay what are called 'soft eggs,' their owners supply them with lime or chalk in their food, with the result of hardening the shells of the eggs they lay.

Nitrogenous substances not contained in animal food only.—It may seem almost unnecessary to advise your putting this point before the children; but mistake concerning it is so common that it must be corrected. You can explain, for instance, how the *fibrine*, or fibre contained in meat, is represented by what is called the *gluten* in wheat, and that all the various characters to be found in animal are also to be found, under one or another varying form, in vege-

table matters as well. Make the children comprehend how this may and must be, by considering that the meat of animals which we eat must have been made of the vegetable matters which fed and fattened them.

Substances necessary in carbonaceous food.—

Much in the same way that you have taught the substances contained in the nitrogenous parts of food you will make your class clear upon those contained in the carbonaceous parts. Because you have taught them that sugar, gum, oil, fat, and starch are to be found in carbonaceous food, it will not at all follow that they will keep in mind a clear distinction between the two principles. Therefore I should recommend your giving them frequent exercises, either on slate or paper, in separating foods, the composition of which you may dictate to them, into their respective nitrogenous and carbonaceous parts. For, remember, these subjects require the use of many words, especially difficult to young minds, and therefore no means should be left neglected of helping their memory by constant repetition, and their thoughts by constant intelligent exercise and questioning.

Illustrations of effects of diet.—More especially in relation to the substances of our food you may give illustrations of its effects on structure. A horse, if doing much work, may sometimes, for instance, look very thin and bony, though eating a great deal of nitrogenous food ; his owner will remedy this, if he wants the horse to look well, by adding some bran to his oats. The same sort of thing is done in order to make animals fat enough for market. Food containing more carbonaceous elements than the body wants for fuel and force is given. Nature stores this up in the form of fat. If men eat too large a proportion of fatty or fuel-forming compared with flesh-forming food, they will grow fat ; and some will grow very much too fat, because the more their fat increases the less exercise they are able to

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take to work off the fuel in breath and perspiration and use of tissue. Very many people whose great fatness is a trouble and worry to them might have it much reduced by leaving off the use of more or less fuel-food, it being perfectly plain that they are in the habit of consuming a great deal more than nature is able to get rid of in her work. An illustration of this you may give in the case of a steam-vessel. Suppose the vessel made to carry 2,000 tons, that she has boilers that require ten tons of coals a day, and can use no more, and that she makes a complete voyage every ten days, using 100 tons. If she take on board for each voyage 200 tons, she will have too much coal on board, the excess increasing by 100 tons each voyage. In twenty voyages she will be useless, for all her space will be filled up with excess of fuel. The remedy for this would be, after the first voyage, to take in only the quantity of coal really necessary for the voyage. The remedy for the over-fat body is to cease taking in more fuel-food than the body needs.

On the other hand, the children may be interested in some illustrations showing how great quantities of fuel-food may be quite necessary. The furnace of the human body must be kept alight, of course, or we die, since a certain amount of heat must be generated to allow us to live. Now ask them what time of year most fuel is wanted to keep the house warm. They will name winter, the very time we all want more fuel-food. Tell them, what is quite true, that nearly everybody is fatter in summer than in winter, probably because they make very little change in their diet ; and, tell them further, that in Northern climates, in the north of Russia, Greenland, Kamskatcha, and such regions, where there is hardly any winter sunshine at all, and a great lack of heat and warmth, nature requires so much more fuel-food than is needed here, that many of the people have to drink oil and live almost altogether on fat to keep themselves alive.

CHAPTER IV.

THE MANNER IN WHICH THE FUNCTIONS OF FOOD ARE PERFORMED.

The process of digestion.¹—You must give your class some idea of this, which is at the bottom of all theories of food, either in its functions or its preparation. To understand this they must learn what different things make up the body, whose constant waste must be supplied. They will thus get a notion of the various substances which enter into the necessary composition of food. Knowledge on the subject of digestion naturally springs from the following consideration :—

How food performs its functions.—Of course, you will feel that your class must be taught a great deal more about the sustenance of life by food than the fact that it supplies tissue, fuel, and force. You will desire to teach, not merely that food does certain work under certain circumstances, but also how and why the work is done. To show a child a lump of coal, and say, 'That takes our soldiers to India, and fetches our tea from China, and brings our friends to the station,' would be of little use in giving the child knowledge, unless you showed him how such work was,

¹ The hints contained in this chapter on the subject of Digestion are limited to that part of digestion over which we ourselves have any real power (as, for instance, in the way of mastication). It has seemed better to leave the fuller treatment of the further processes of assimilation of food to be dealt with under the head of Physiology.

not indeed done, but assisted, by the use of coal. To say, as you give a child a piece of sugar, 'This will supply warmth to your body,' will certainly not be true if the child only keep the sugar in his hand, and therefore you must not be content to state, but also to explain, the functions of food to your class. The necessity for doing this suggests itself at the first mention of the word 'digestion.' You see you will have to explain the various steps of a long succession of processes. Suppose you put a piece of ice, a piece of sugar, and a spoonful of tea into a cup before your class, and ask them whether they will call that a cup of tea. If they say Yes, ask them to drink it ; they will see it cannot be done. If they say No, ask them why not, and you will have set them on the plain way to understand the process of digestion. Make them point out what must be done with such ingredients as I have named, and they will show you that the sugar must be decomposed, the ice must be melted, the tea must be softened and infused, before the ingredients can become drinkable at all, or fit to begin their course of supplying food or nourishment to man.

The first stage of digestion.—The foregoing illustration will have shown your class that in order that the body may obtain all the different parts of its food in a form likely to do it good, the food must be separated into various parts ; that the crystals of sugar, for instance, combined with each other in the lump, must become separated in order to enter into new combinations with portions of our bodies. The very beginning of this process you will be able to point out as the act of *tasting*. Let the children, for instance, apply a piece of soda and a piece of stone to their tongues, with their eyes shut. You will find they will all be able to tell the difference between the two things. They will tell you the soda had a taste, but the stone had none. Set them on explaining this to themselves. The touching of their tongue, which is always wet for the pur-

pose, really melts away some of the soda, but melts away none of the stone ; and it is the part that is melted and remains in the mouth which they actually taste. If the tongue were *perfectly* dry, and not provided with moisture to melt what was put on it, we could no more taste with it than with our knuckles (though of course the moistening of our knuckles, though it would help them to decompose soda, would not give us the means of tasting it). Thus the children will see that we cannot taste food without thereby beginning the process of digestion of that food.

Saliva and its use.—This will suggest a little teaching on the nature and supply of saliva, and give you an opportunity of illustrating, in passing, the action of the mind upon the body. Stop your class an instant, tell the children to swallow down their saliva, or spittle, and ask them after a few moments whether their mouths be dry. They will answer No ; for the very thought of the thing will have brought a fresh supply of saliva rushing through what are called the salivary ducts from the salivary glands into their mouths. Show them that, though, if thinking of the matter, this supply becomes so copious that they will not be able to spend a minute without wanting to swallow down its excess, yet, when not thinking of it, they may sleep seven or eight hours without requiring to swallow at all.

Ask them again where this water comes from that is so necessary to all digestion, and is so abundantly supplied, and show that it must come from the food and drink which we take, through the very process of digestion to which it is so indispensable.

Why it is necessary.—The illustration of the lump of sugar will help you here. If the mouth were dry, and a lump of sugar were placed in it, the sugar could not get down into the human stomach. How do we set about melting a lump of sugar ? By pouring water upon it. This is just what

nature does. And how do we do this most quickly. The children will answer, by using hot water ; and you can show them that this is nature's process too. Go further, and ask, if they want to melt a pound of sugar, and have only poured on an ounce of water, what would they do? They will say 'fetch more water ;' and this is nature's plan again; according as the mouthful to be digested is more or less dry, the salivary glands will send at once more or less saliva to the mouth. This also is a reason why eating and drinking generally go together with us, and that the drier our food and the more saliva it requires to soften it for swallowing, the more we seem to feel the want of a draught of tea, coffee, milk, or water, to help it down.

Thus the children will learn that nature expects everything of food kind which we swallow to be swallowed in a moist state. Now ask them why, and lead them to two reasons for this. These will be, firstly, because what is called our mucous membrane (that is, the moist skin that covers us inside, just as the ordinary skin covers us outside) is so tender as to be very easily scratched and wounded, and that we might be very seriously injured by swallowing down hard, rough substances. This will bring you to the second reason for moistening what we swallow, namely, that we should not give a delicate organ like the stomach, on the health and strength of which our very life depends, an unnecessary amount of work, by making it do what might be so easily done for it in carrying on the first processes of digestion. Show them as an illustration that to give the stomach entirely unprepared things to digest, would be like expecting a baker not only to mix and knead and bake his flour into bread, but also to sow and reap and thrash and grind the wheat from which the flour is made.

Saliva not entirely water.—Before you leave the subject of saliva you may teach your class that it does not altogether consist of water, but that it holds in solution a

portion of muriate of potash, which acts upon the food with a certain amount of digestive power. In passing, you may incidentally hint at the injury and weakening of the system which may result from the very useless and disgusting trick of spitting, which so many people thoughtlessly contract. They may also be taught that the saliva of infants, before they cut their teeth, is not of the sort it afterwards becomes, and is only capable of digesting milk, so that very great harm is often done by feeding young infants on other substances. Bread, as we have seen, generally contains starch, which the saliva of a baby cannot digest as that of an older child would ; and so the little creature, though taking food, may not be taking nourishment, and may actually starve to death, as in fact very many do.

Meaning of the word 'secretion.'—The calling the children's attention to the supply of saliva by the salivary glands will give you occasion to explain, what may otherwise confuse them, the meaning of the word *secretion*. Its common use nowadays is, in the sense of *hiding away*, but in its first and proper use it has the sense of *separating*. Thus you will explain to them that we have a number of organs in our body which *separate*, or take out, from the mass of our food, the ingredients for making various different liquids necessary for carrying on natural functions. From our meat and drink the salivary glands *secrete* or take out saliva ; the lachrymal glands *secrete* tears, to keep our eyes moist and unhurt by the friction of the eyelids ; the liver *secretes* bile, to help the digestion of our food. You may illustrate this by letting them consider that all these different organs treat our digested food just as a number of letter-carriers do the contents of a mail-bag when emptied out before them ; each takes what belongs to his own district, and *separates* it from the rest for its own especial purpose.

The surplus of our food.—Carry your illustration a little further. Suppose the letter-carriers find a number of

papers and letters not belonging to their district ; it is somebody's business to carry them away, and try to turn them to proper use. Just so let the children see that, after all the organs have taken out and separated the different ingredients wanted to carry on our life, to supply waste, and warmth, and force, nature makes it her business to cast out and get rid of all the remaining ingredients. For instance, as they have seen that a vastly larger quantity of water is necessary to enable us to swallow down any solid food, than is required for supplying waste, warmth, and force, nature is continually casting out quantities of water from the body by the breath, by perspiration through the skin, and otherwise.

Importance of mastication.—If the supply of saliva have one particular work to do, in softening food before its reception into the stomach, the children will understand that the supply of teeth in the mouth is provided for another function, that namely of separating and dividing food into parts conveniently small. And here you have really an important lesson to give. The supply of saliva is involuntary—it comes of itself, according as it is wanted, and in just sufficient quantity ; but you must point out that though mastication is so far involuntary that a man cannot swallow solid food without masticating, it is his convenience and choice, not the absolute necessity of his nature, which regulates his masticating much or little. Try to impress upon the children the value, to their whole future health, of the habit of eating slowly and of masticating thoroughly. Suggest to them to try whether doing this will not greatly increase even the physical pleasure they have in eating things they like, by gratifying for a longer time the nerves of taste which lead them to the choice of agreeable food. And as this seems rather a sensual basis on which to place your teaching, show them how such a habit will be likely to keep them free from all the suffering so many people undergo, at least in later years, from weak and faulty digestion ; which generally

results from their having habitually, by the neglect of perfect mastication, given the stomach too much work to do, and so worn-out and exhausted its best powers.

Advantage of warm food.—Another practical point, on which you may lay stress, is the advantage to easy digestion of food being taken warm. Show that the warmth in the food helps the furnace of the body without enforcing so much expenditure of fuel, in the same way that a shovelful of live coals added to an ordinary fire increases its heat. Thus we find nearly all persons accustomed to swallowing a great part of what they drink warm, in the form of tea or coffee, and finding it much better, and, as they think, much more nourishing, than cold water; the fact being that the tea and coffee contain very little nutrition at all, but the heat they contribute to the body takes the place of nutriment, which otherwise would be expended in producing the same amount of heat.

Effect of cold on digestion.—From the last paragraph you will be able to explain why very cold things taken into the stomach should obstruct and stop the process of digestion. The eating of ice has directly this effect; it takes away from the stock of vital heat, and retards the decomposition of food in the stomach. Illustrate this again by the slowness with which a lump of sugar will dissolve when put into a tumbler of iced water, as compared with a lump placed in a tumbler of boiling water.

These instances will probably suffice to make the children comprehend how great an economy of vital force and energy is effected by the use of warm food and liquids as compared with cold ones; but you may further illustrate it by the analogy of the greater hunger being felt, and the greater quantity of food being required, by persons suffering from cold in winter than by others who spend their time in warm and comfortable rooms; and, once more, by the fact,

that because people receive far more warmth from the atmosphere in summer than in winter, they are less hungry in the warmer season, wear less clothes to keep up their vital heat, and yet almost always, as I have before reminded you, increase in weight in the summer, while they eat more food, wear more clothes, and yet decrease in weight during the winter season.

CHAPTER V.

THE PREPARATION OF FOOD.

Preparation of food as distinct from cooking.—

The Code separates these two things, in terms, for convenience' sake, and you had better adopt the same plan with your class. Point out to your pupils that though there are many things eaten without being cooked, but very few are eaten without some preparation. Ask them for examples of things which we eat uncooked. They will say milk, cheese, butter, and perhaps many other things which can be used without actual cooking by the kitchen fire ; but, after all, you will find them name very few things, except perhaps raw fruit and shell fish, which are eaten without being specially prepared.

You can very profitably spend part of the time devoted to this subject in teaching them the modes of preparation necessary for many of the articles they most commonly use. For instance, many a town child has no idea of how butter is made from the milk of cows, and many country children even know nothing of the manufacture of cheese. These are, of course, every-day instances, but a teacher can think of many more, the citation of which will increase the pupils' knowledge and stock of ideas.

A great number of processes may be made plain to them. The growth and preparation of mustard, pepper ; the making of vinegar ; the processes of distillation, brewing, baking ; the winning of salt, with many interesting details as to its comparative value at different times and in different places ; the preparation of cacao ; the salting and pickling of meat ;

the method of tinning and preserving fish and food of all sorts ; the means of detecting adulteration in common articles of food, will all be found matters of interest to your classes.

Preparation of food for cooking.—This is another branch of the subject, however. The preparation of some substances for food is independent of cooking ; but many others require a special and immediate preparation before subjecting them to the fire at all. Instances of these of course are at hand. Vegetables must be carefully cleaned, peas and beans must be taken from the pod, carrots, parsnips, and turnips must be scraped, rabbits skinned, fowls plucked, salted meat soaked to dilute away excess of salt, and so forth. All these are matters of detail, which can be taught in a very short time by practice where cookery classes are established, but concerning which very little can really be done in common oral lessons. One or two points, however, should be insisted on as indispensable maxims ; such are the washing of all food before cooking, and the paramount importance of constant and scrupulous cleansing of every cooking utensil as soon as possible after use. For this purpose chiefly a good supply of water, not merely warm, but boiling, should be insisted on as of great importance even in the poorest cottage ; and the children should be taught, if there be no boiler, the economy in the end of spending a little more money on a large and strong kettle rather than less money on a small one. The feeling of having but little hot water to spare will often induce housekeepers to leave their utensils without proper cleansing. Ask the children why this cleansing should be even more strictly attended to in a small house or lodging than in a large one. They will see that where the utensils are fewer they are each used for a greater number of different purposes ; also that where space is small and fresh air limited, the smell of ill-cleaned cooking vessels is more likely to prove injurious than where room and ventilation are greater.

Marketing, and purchase of food.—Another matter connected with food preparation, but distinct from cooking, is the knowledge how to provide the best food at the cheapest rates. The exercises suggested in my former little volume, 'How to teach Domestic Economy, First Branch,' will have given the children some practical aid towards studying these points. A knowledge of how to buy things cheaply is of great, almost untold, value. Urge on the children, especially if in towns, where shops are many and the matter easy, to make estimates of expenditure from the prices they see advertised. They will see that sometimes certain matters of food are much cheaper than others; they should be taught that, when they try to keep house, such occasional cheapness should be taken advantage of. For instance, one day a fresh herring can be got nowhere under a penny; but the next, there may have been a glut in the market, and they may be bought for sixpence a dozen, or less. Show the children that in such a case a housewife who knew enough simple cooking to 'pot herrings,' as it is called, might prepare a quantity of good food at a very small price, which would give pleasant variety to other foods for ten days or a fortnight. A number of similar instances might be put before the children, and they might be encouraged (if your managers will sanction it) by promises of small rewards at the end of the half-year, to compete in drawing up marketing bills and housekeeping estimates, at the actual prices current on the dates on which the competitions were given out. This sort of thing, if set before the children as an amusing game, in the way of 'playing at housekeeping,' might lay the foundation of great practical skill in many of them. Another point to be attended to is how to keep food fresh—a matter attended with great difficulty in town districts, where several families occupy the same house, each family living only in one or two rooms; and where such a thing as a larder is unknown. Show how much of this difficulty may be obviated by a little meat-safe, its sides made of wire or perforated zinc,

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being hung out of window by a cord and pulley. If made with a double shelf, or divided into two compartments, such a contrivance will preserve both meat and milk.

For the rest, as regards the preparation of food for cooking, many valuable rules will be found in various manuals on the subject, some at least of which the teacher is presumed to be familiar with. The hints I have inserted here on the subject are only meant as illustrations and samples of the method a teacher may follow in awakening, and, if possible, in keeping awake, the interest of his pupils on the subject.

CHAPTER VI.

THE CULINARY TREATMENT OF FOOD.

Importance of knowledge of cooking.—From what you have taught already as to the duty of giving as little unnecessary toil as possible to an organ so delicate and important as the stomach; as well as from your demonstration that every morsel we put into our mouths is immediately set to work upon by nature in order to send it down, if possible, in a moistened and simplified condition, the children will recognise of themselves that the true object of good cooking is the assistance of digestion, and that the more carefully this is done the more real good will be derived to the body from the food taken, and the more healthy will the bodily functions be.

Beyond this, however, they should be often reminded how much injury and sickness is caused by bad cookery, to say nothing of the money waste caused by the spoiling of food. It is, of course, entirely beyond the scope of such a little manual as the present to offer receipts for the production of various dishes, or, indeed, to do anything beyond offering such suggestions as may prove useful in directing the teacher's attention towards some points which should be made clear to those he teaches, and which might otherwise escape his notice. I have already referred with approval to Mrs. Buckton's book on 'Food and Home Cookery,' and to Mr. Bartley's 'Domestic Economy,' which contains a great many suggestions of the highest value. And these are by no means the only handbooks likely to be of value to both

teachers and scholars. But I would urge teachers, as far as they can, to induce their managers to offer as prizes, more especially in the food branch of domestic economy, some of the many good cookery books specially adapted for cottage conditions, and to be had at a very moderate cost.

Desirability of practical teaching.—But there is probably nothing harder to teach by mere telling than the art of cookery. It is something in itself so entirely practical, that without a fire-place, the necessary utensils, and ingredients of food to use before the pupils' eyes, and to let them handle and practise upon, but a very small progress can be made. There is an old saying, 'An ounce of practice is worth a ton of precept,' and so it is with the teaching of cookery. Arrangements are now sanctioned by the Education Department by which the girls in town schools can receive systematic instruction in this most useful art, and nothing can be more useful as a manual for its teaching than the little book by Mrs. Buckton, 'Food and Home Cookery' (London, Longmans), which contains a number of practical lectures on the subject.

Difficulties in teaching practical cookery in country schools.—In towns it is easy to provide such instruction, because a number of girls from various schools can be brought together at different centres; a thing quite impracticable in the country. Unless the teacher of a country school be, if a woman, skilful in her own little kitchen, or, if a man, have a wife who knows something of practical cookery, I fear there is little prospect of giving practical teaching.

But though practice is better than theory, we must remember that theory may be, and is, a good thing in itself, and we must endeavour, as far as possible, to make the children know some of the principles of good cooking, even though they may not have opportunities of putting them into practice.

The fire for cooking.—Fire, of course, is a first essential for cooking, and the children should be given some notion of how it should be managed. The ordinary fire-places in poor people's dwellings are apt to cook worse, and to waste more, than those of any other country than our own. Try to impress upon the children the advantages of, we will say, the American 'Gem' cooking stoves, both for warming the dwelling and preparing food. A difficulty, however, arises in this, that even a picture will not explain to them these advantages in any way that they can clearly understand. If your school managers could be induced to place one of these stoves in a cottage for a time, say through one winter, or even in the schoolroom, so that its parts and the manner of its employment could be shown, though it might not make many villagers buy one, it would convince many of the children that, when they grew up and were taking a house of their own, they would do best to procure such a one, both for comfort, effectiveness, and cheapness in consuming fuel, rather than any of our ordinary extravagant grates.

The best to be made of present conditions.—Desirable though it be, however, both for ease of teaching and for demonstration of comparative usefulness, that such a stove should be available for the instruction in cookery, it would of course be an absolute folly to let the teaching wait till a general improvement in fire-places had taken place. Therefore let the teacher try to master the conditions of such fire-places as the children under instruction have to use, and instruct them how best to overcome their disadvantages. For this purpose some handbook on heating should be consulted, and the subjects of draughts of air, combustion, and ventilation looked into. A practically useful thing would be for the teacher to take an opportunity (if in the country, not on a market day, when shop-folks are very busy), to go to some large ironmongery store and ask to be shown stoves,

grates, ranges, &c., of different sorts, and to have their differences explained by the shopman. Ten minutes spent in this manner will prove more valuable than hours of description.

The cooking-fire.—Of course all your pupils will agree that a clear red fire is the sort desired for nearly all cooking operations. Set your class on stating how they would secure this. Suppose it be desired to broil some meat over the fire, ask them what the result will be if fresh coal be applied just before the gridiron is set on. They will, of course, answer that the meat will be smoked and spoiled. Ask them again what the result is likely to be if the fire be blazing high when the gridiron is put on. They will answer that the meat will be actually burnt black. This will lead them to see that to cook well the fire ought to be prepared some time beforehand, so that, instead of blazing or flaming, it may be easily brought into a clear state when the cooking begins.

We will suppose that it is desired to cook food so as to have it ready to eat at one o'clock. Suppose the fire to have been lighted so as to boil water for breakfast at eight o'clock, and that it is desirable to waste as little fuel as possible in cooking both meals. Ask the children to advise whether the morning fire should be let go out or be kept up the whole intermediate time ; that is, we will say, from eight to eleven o'clock, when the dinner-cooking begins. Most of them will advise its being let out and lighted a second time ; and yet this in most cases would be a mistake. Show that by letting the fire go out the grate would probably be cold by nine o'clock, and that to make it as hot as it had been again by eleven would take a new supply of paper, sticks, and coals ; and that, in order to get the second fire at all into a fit state for cooking, both time and trouble would have to be spent on blowing it, with the result of wasting much fuel, by blowing away a great deal of it up the chimney,

in the form of unconsumed smoke. Perhaps some intelligent child may say, 'Even that would cost less than keeping the fire up at a blaze the whole morning;' and the child would be right. This will, however, give you the opportunity of showing that neither of these things need be done, by explaining the principle of slow combustion, and making them understand how most of the heat got up in the breakfast fire may be preserved and kept waiting, without loss, till the time comes to begin the cooking of dinner.

On what does combustion depend?—On the amount of air supplied. You can make this plain to them in many ways. The action of the blowpipe, as exhibited in the common bellows, will illustrate it perfectly. Show them that all the fuel in the world will not burn without air. That if a coal-mine take fire, the conflagration is checked by shutting up the pits so as to cut off all supply of air. You may show the same thing by covering, more or less completely, a lighted candle with a tumbler. Exactly the same principle, you can show, is applied in limiting the combustion in the fire. If less air be allowed to get to the fuel, it will burn far more slowly. Therefore by covering over the top of the fire, so that very little air can pass through it, the fuel will be checked in its rapid combustion, and kept hot and ready, when the air is again allowed free course through it, to burn up brightly and clearly. Thus they will learn why the cheapest plan of managing the cooking-fire is to give it much air when cooking is wanted, and to diminish the supply of air when the cooking is done.

But how is this to be done?—In the American kitcheners this is quite simple. A door is drawn across the front of the fire, which prevents all air passing into it or through it from beneath; but lest it should, if quite deprived of air, go out altogether, the air is allowed to pass over the *top* of it, which just keeps it alight, with the smallest possible

combustion of fuel. Show how in our common English fire-places the same thing can be done, but in a more troublesome way, by what is called making-up, or 'slacking,' the fire.

'Making-up' and 'slacking.'—Most children will have seen the former done. It consists in covering up the fire with the ashes from below the grate, which to a great extent prevent the passage of air through the fire and make the combustion slow. 'Slacking' you will show to be the same process, but done with a quantity of dust-coal (otherwise very hard to make use of) wetted with water, mixed like thick mortar, and laid thickly over the top of the fire. Let the children explain how a 'made-up' fire remains alight. It will be by aid of the air which passes the front of it, in the same way as the closed kitchen-fire is kept alight by the air which passes over the top. As the water in the case of a 'slacked' fire may tend to put it out, they will understand that the combustion must not be made too slow, and that therefore a hole should be made with the poker through the 'slack' into the fire, so as to allow a very small current of air to pass through.

Advantage of 'slacked' over 'made-up' fire.—The children will think at first there is none. Lead them to reflect that the ashes used in 'making-up' a fire can give no heat, while the otherwise useless coal-dust, with which the fire is 'slacked,' dries into a hard cake, which, when broken up, being already heated through, will burn clear and bright for cooking purposes much sooner than any fresh cold lumps of coal, much of which will have to go up the chimney in smoke before the rest burns red and clear in the grate.

Utensils for cooking.—In ordinary schools care should be taken, where practical cooking lessons are given, to limit the number of different utensils employed pretty nearly to those available in ordinary dwellings. It is not merely as

a matter of economy in first cost that this point should be attended to, for it might be supposed that, though ten sauce-pans would cost twice as much as five, they would be likely to last twice as long. But teachers should keep in mind that in a labourer's cottage, and still more in an artisan's often very crowded lodging in town, space is very limited, and its requirements must be carefully kept in mind.

You will find in most of the manuals quite an alarming list of various utensils required for school cookery, and I cannot but think this a mistake. Mrs. Buckton's excellent book, 'Food and Home Cookery,' has this considerable drawback. The lessons she describes are given by means of an apparatus, contrived of course with special reference to economy of space, but occupying a space of about seven feet in height and width and two feet in depth. Of course no such cupboard as contains her apparatus is required in a cottage, but still the space required by its contents would be as large. One argument, however, in her favour is that if the children be trained by the use of the best utensils to cook food well, they will adapt their knowledge to the less favourable circumstances of their homes in after-life.

Get the children to name, from home experience, all the kitchen utensils they can think of. It will interest them much to give them five minutes to write down the names of all these. When finished, ask who has put down the greatest number, and let the list be read out. The other children can mark in their lists any additional articles not mentioned by themselves, and the list be thus supplemented. You will, as a fact, find a very small number of cooking utensils included.

Importance of supply of hot water.—This cannot be over-valued in the practice of cookery. Point out its advantages, and how great a hindrance and delay the want of hot water may be in preparing food. Let the children enumerate the different matters it may be wanted for in

cooking a meal. This will be a means of showing them the advantage of a good boiler attached to their fire-place, or if not forming a part of it, always kept in any case moderately warm. You may also show that a small quantity of water extremely hot is far more useful, and less troublesome to carry about, than a large quantity containing less heat.

Different processes of cooking.—Ask questions upon these, and see what child can name the greatest number, describing the utensils required for each. The vast majority of them will name first the particular instrument which is absolutely the worst of all for preparing the food of man, and thus show in a moment how greatly the teaching of proper principles of cookery is wanted. For the frying-pan is certainly the most general, in thousands of cases the only, utensil in which meat is cooked.

One instrument you will find hardly any of them think of, the want of which is the source of a great deal of waste among the poor. This is a scale and weights. It would amuse the children if, having shown them a pair, you explained the principle of the balance in a brief way, and suggested to them to try and contrive a set of scales for themselves. All that is needed is a piece of stick, and two or three yards of twine, and for the scales a couple of the little tin plates, not costing more than a penny, to be found in most cottages, with the letters of the alphabet printed round the edges. Let them guess means of supplying weights. These are easily contrived, either by a little patience in trying single pebbles till they find one exactly fitting each standard weight, which you may lend them for a few minutes to try with, or by rubbing down pieces of brick to the proper size. Pebbles are best for this purpose, as not absorbing water and changing in weight in the same way as bricks must in wet weather. Small gravel put up in little bags will answer the purpose well, the weight each bag represents being written on the outside. Childish though it may sound, the setting poor

children to play at shop with a rude apparatus like this, may teach them a very valuable point of domestic economy.

Different processes of cooking meat.—The utensils the children name will suggest the processes in which they are used. The frying-pan to fry ; the gridiron to grill or broil ; the pot to boil ; the stewpan, or saucepan, to stew ; the oven to bake. You will find very few of them who will include in their catalogue any contrivance for roasting.

Frying.—Though, as we have hinted, the frying of food, generally speaking, is by no means the most wholesome or economical way of preparing it, it will be plain to the children that there must be some reason why it should be so universally employed as it is. Set them to think of the reasons. They will be of this sort. The process is rapid ; it does not involve as much trouble as in the basting of roast meat, or in the frequent turning of meat on the grill ; nor so much fuel as is necessary for carrying on all the longer processes of cookery. And there is another reason, namely, that poor people, for the most part, are accustomed to cook only a small quantity of meat at a time, have but little time to devote to its preparation, and are glad to use as little fuel as they can.

Treatment of other processes.—You can take the different processes one by one, and make the children think out the different advantages and disadvantages attending each of them. If, for instance, you show that the effect of frying a piece of meat is to soak it with burnt fat, and thus to supply the stomach with a matter difficult of digestion, you can show the comparative advantage of the grill or gridiron, which, by letting the fire first slightly harden the outside of the meat, keeps in the juices, which in the pan are either lost, or mixed with fat, and likely to cause indiges-

tion. In passing you can suggest occasionally a valuable hint to the children. Ask if they know any one complaining of indigestion ; some of them certainly will. Suggest that if they tried for awhile some other way of cooking than the frying-pan they might be better, and so forth.

You will find the relative values of the various processes set forth in nearly all the food and cookery manuals, and their study will properly occupy a large part of the time to be given to this branch of the subject. The main object to keep in view is to make the children *think*, and, as far as possible, instead of laying down maxims first, to induce them, in answering a number of apparently simple and obvious questions, to come, as if by the natural process of their own thought, to understand and adopt the maxims you wish to inculcate. In the same way a child will be more apt to have an intelligent knowledge of the distance between Hyde Park Corner and Chiswick by having walked it in pleasant company one fine day, than by having heard it read out by some one from a list of cab-fares.

Importance of the stewpan, and of the stockpot.—But there are two matters of the utmost value to the poor in the way of cookery which are the most universally neglected in our country. The one is the art of stewing, the other the value of soup. ‘Gather up the fragments that remain, that nothing be lost,’ are words implying an actual duty which is too little attended to. The stewpan will take in all sorts of food, and accomplish with wondrously little waste a vast amount of the special work of cookery, which is to get as much as possible of the digestion of food done before it reaches the human stomach, and thus to save as much labour as possible to that always hard-working and most important organ. Show the children how the cooking of food in a close stewpan retains all its constituents, while the other processes, as we can tell perfectly well by our sense of smell, are continually parting with atoms of the

substances cooked that never reach our mouths at all. Let them also be taught how much softer the food is made by stewing, how much easier the mastication, how much more perfect the digestion, and how much better the nutrition afforded to the whole body in consequence.

The stockpot.—I have gone a little out of my way to lay particular stress on the advantages in the way of economy both of time, fuel, food, and digestive labour to be gained by intelligent use of the stewpan ; and I will conclude by urging, for the very same reasons, the importance of teachers impressing on their scholars the value of the stockpot, with its continual supply of soup. The enormous waste in nutrition caused by simply throwing away the liquid in which our food is boiled is little realised ; and the fact, that with the vast number of cheap ingredients by which such liquid may be made into nourishing and palatable soup, with a continual variety of thickening and flavour given to it according to taste, should be constantly drilled into children's minds. If opportunities could be afforded of showing them that in many houses of the upper class the stockpot is kept constantly going, and of tasting its contents, they might be persuaded, when they became housekeepers themselves, to try the system. They would then, perhaps, find that what all Frenchwomen can do most Englishwomen might do as well, with a wonderful advantage both to their persons and their purses, in the way of domestic economy.

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